



Transmission charging and growth of renewables in the UK

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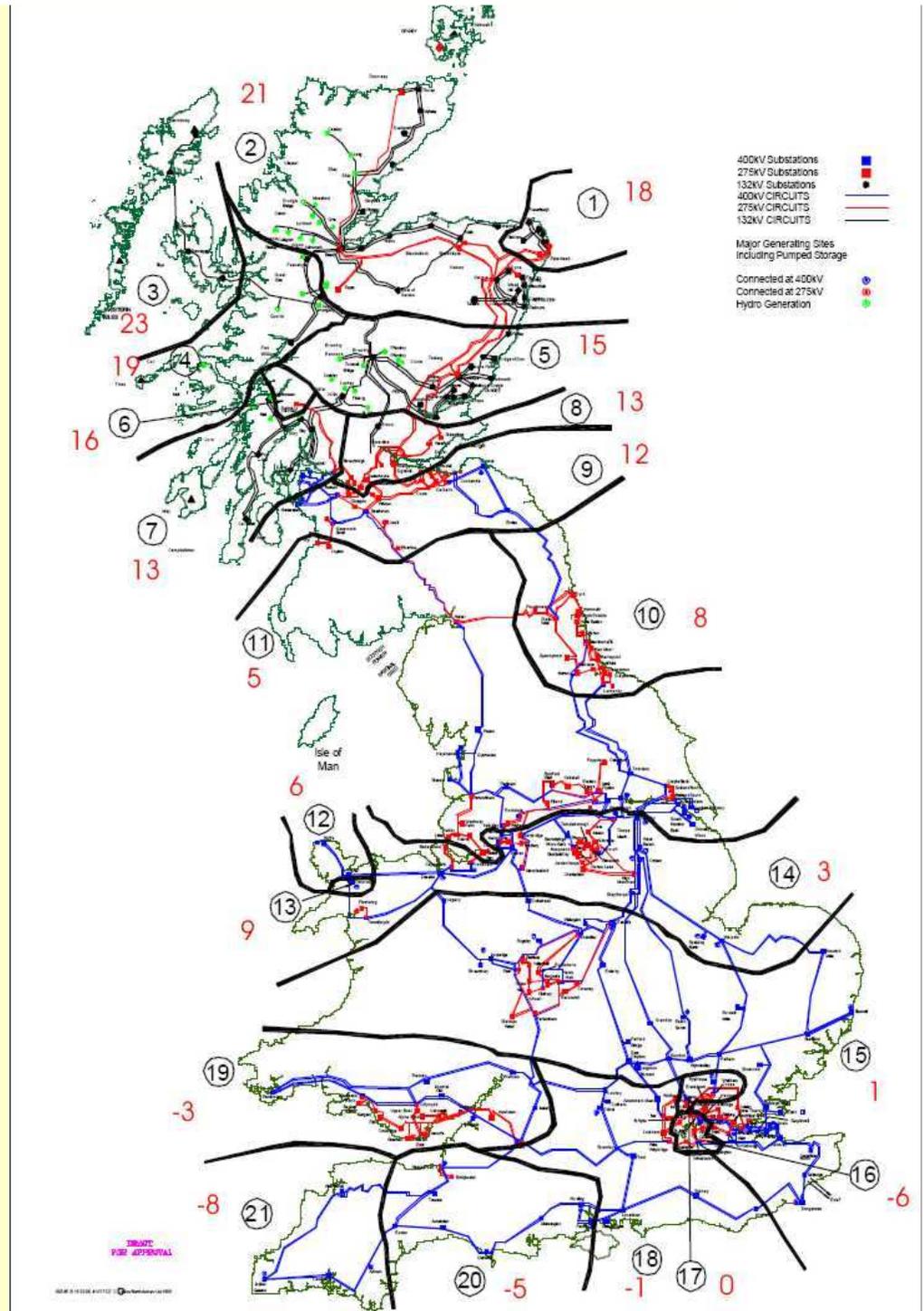


Access charging under NETA (BETTA)

- Need to recover allowed transmission revenue for National Grid (about £1.1 bln/year)
 - Transmission Network Use of System (TNUoS) fixed annual locational capacity charge (£/kW) irrespective of usage payable by all transmission-connected generators (> 100 MW)
 - Connection charge to recover the direct cost of connection (not considered here)

TNUoS charges 2005/6

- High (+)ve Scottish charges: 1GW plant would pay £23M annually in zone 3
- Low and (-ve) English charges: 1 GW plant would get paid £8M in zone 21
- Politicised debate in Scottish Parliament and Westminster
- Legal challenge by SP dismissed by High Court in October 2005
- Ofgem: effect on Scottish generators broadly neutral due to abolishing of Interconnector charges





TNUoS charges and renewables

- Government worried that high TNUoS charges may adversely affect renewables in Scotland and threaten the national targets (10% 2010, aspirational 20% 2020)
- Energy Act 2004 includes a provision for State Secretary to limit TNUoS charges in specified areas for up to 10 years
- This paper contains main results of a study DTI commissioned to estimate effect of any discounts
- Consortium: C. Bronsdon & G. Connor (SEEF), Q. Zhou & J. Bialek (Univ. of Edinburgh), H. Snodin (Garrad Hassan), K. Keats (ICF Consulting), K. Neuhof (Univ. of Cambridge)
- Full report available from my website:
<http://webdb.ucs.ed.ac.uk/see/staff/staff.cfm?person=jbialek>



TNUoS methodology

- Supposed to reflect the cost of installing, operating and maintaining the transmission network
- DC load flow (DCLF) model run for the maximum winter load
- Calculate increase in network flows when generation at a node increases by 1 MW (nodal marginal MWkm)
- Multiply the increased flows by expansion constant:
 - £9.8/MW.km for 400 kV lines
 - 132 kV line about twice more expensive
 - Cables about 20-27 times more expensive
- Multiply the resulting nodal prices by Locational Security Factor of 1.8 to reflect secure dispatch (N-1 contingencies)

- Add a uniform adder to ensure 27:73 split of charges between generation and demand
- Add a non-locational element to recover the allowed revenue (£1.1 billion)

Results of DTI commission - Methodology

Garrad Hassan

ICF Consulting

Generation Model

Economic dispatch model to produce a generation forecast and peak demand data up to 2015. Also, impacts on wholesale and carbon prices

U o Edinburgh

Tariff Model

Use generation output and location data to run NGC DCLF for the UK and produce estimated annual TNUoS tariffs to 2015

Specific RE Data

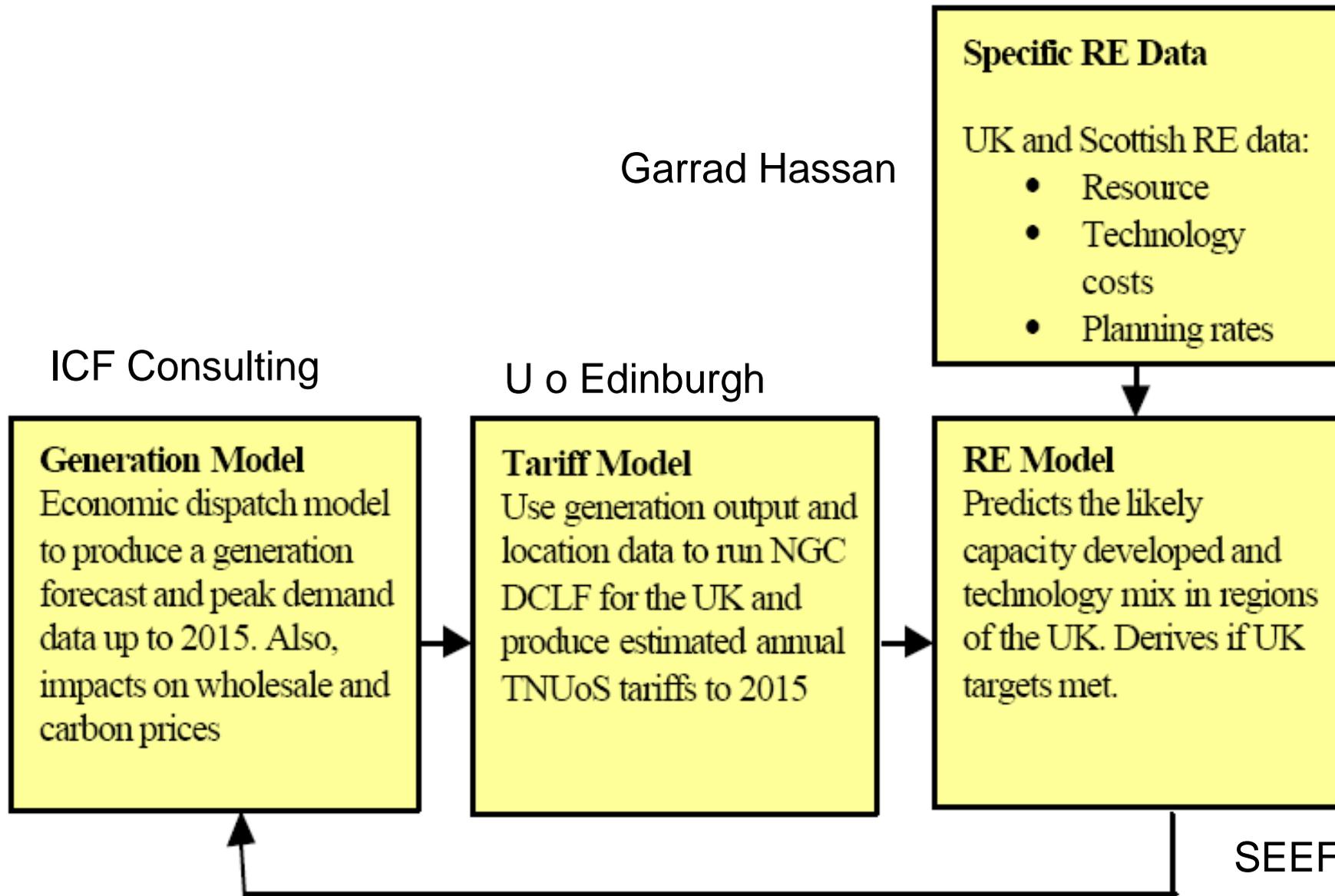
UK and Scottish RE data:

- Resource
- Technology costs
- Planning rates

RE Model

Predicts the likely capacity developed and technology mix in regions of the UK. Derives if UK targets met.

SEEF



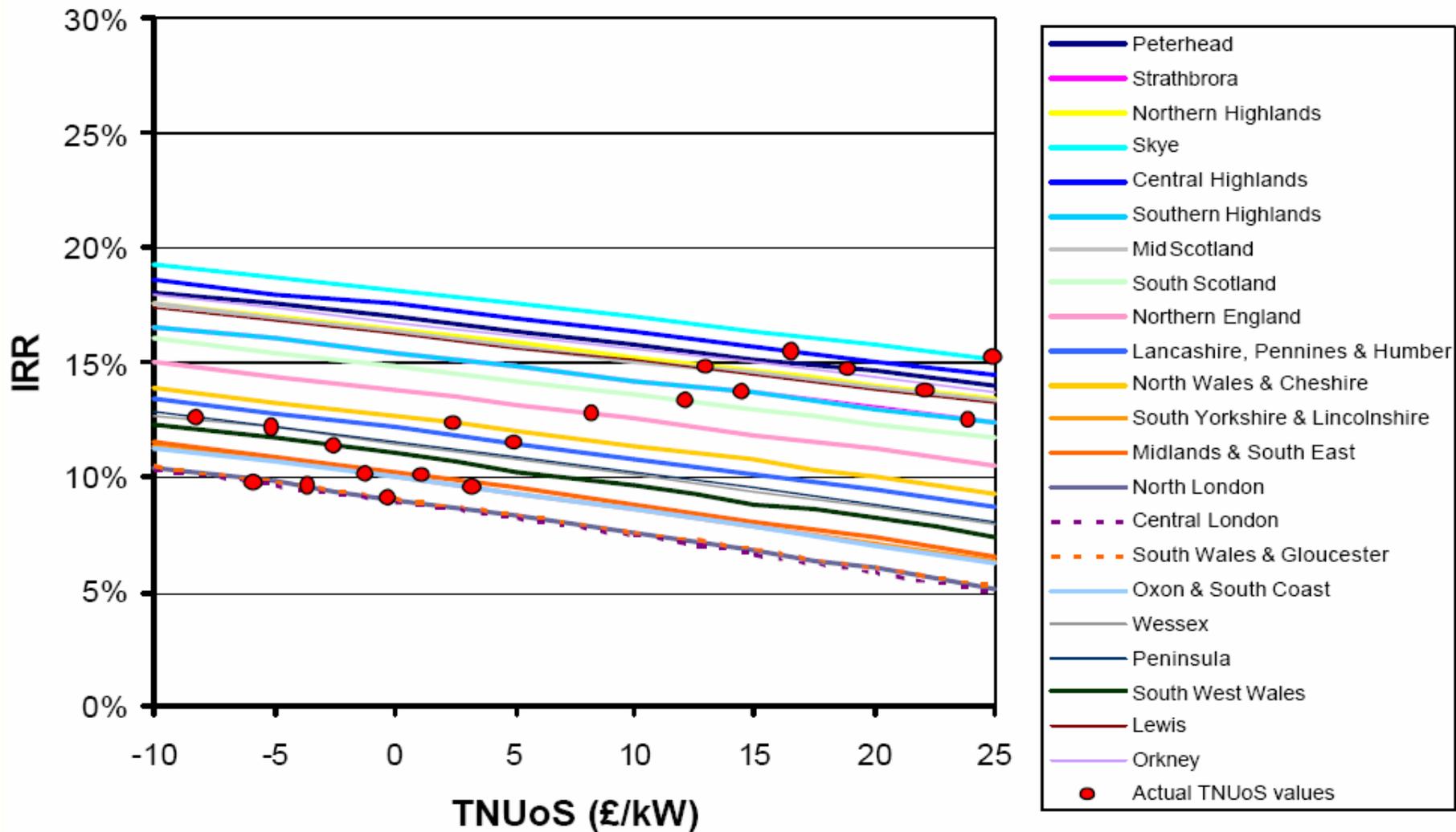


Impact of Scottish Mainland dispensation: dynamic analysis (interactions with ROC mechanism)

	20 December 2004 NGC Methodology: no dispensation			20 December 2004 NGC Methodology: maximum dispensation of 100% above £13/kW		
Year	Optimistic % UK Supply from RO eligible RE	Base % UK Supply from RO eligible RE	Pessimistic % UK Supply from RO eligible RE	Optimistic % UK Supply from RO eligible RE	Base % UK Supply from RO eligible RE	Pessimistic % UK Supply from RO eligible RE
2005	3.65	3.53	2.45	3.65	3.64	2.45
2006	4.92	4.34	3.08	5.04	4.44	3.08
2007	6.07	5.41	4.09	6.19	5.51	4.10
2008	7.38	6.00	4.58	7.50	6.10	4.59
2009	7.69	6.14	4.71	7.81	6.24	4.72
2010	8.85	7.20	5.78	8.99	7.37	5.83

Why there seems to be no major impact of dispensation?

Comparative advantage wind resource: even with high TNUoS charges Scottish wind generators enjoy higher IRR than E&W ones



The effect of TNUoS on relative project internal rate of return (dots indicating the actual returns under NGC 20 December 2004 TNUoS charges for selected areas)



Other reasons for a small effect of dispensation

- RO mechanism is self adjusting (negative feedback) to shortfall against the annual levels of RO
- High percentage of RE generators (39% of GB) are connected at distribution level so they are not directly exposed to TNUoS charges
- 10 year dispensation regime from 2005 has little effect on capacity built 2010+

Effects of dispensation

- Dispensation would make additional RE projects in the area more viable and increase profitability of existing projects
- This would be financed by higher demand tariffs in GB
- RE in the rest of GB would earn lower income due to lower ROC price than would have been otherwise
- Dispensation might displace marginal RE projects in E&W with ones in Scotland



“Static” spreadsheet analysis of IRR without modelling ROC mechanism

- Indicative of how more conservative investors might behave
- 3 indicative onshore projects: 20 MW, 50 MW and 200 MW
- Small and medium-size projects not attractive without dispensation
- 5 or 10 years discount of £8-12/kW would provide project benefit
- Higher energy rates (£55-60/MWh rather than assumed £50/MWh) could improve benefit



Results of “static” analysis with £13/kW cap on TNUoS

Zone	Undispensated Financial Return by Capacity (MW)			Dispensated (Cap set at £13/kW) Financial Return by Capacity (MW)		
	Profitable	Marginal	Unprofitable	Profitable	Marginal	Unprofitable
Peterhead	527	0	9.1	527	0	9.1
Strathbrora	91	22.1	0	100.1	13	0
Northern Highlands	265.3	363	0	628.3	0	0
Skye	68.25	0	0	68.25	0	0
Western Highlands	0	0	0	0	0	0
Central Highlands	25.4	0	0	25.4	0	0
Southern Highlands	129.95	0	65	129.95	0	65
TOTAL	1106.9	385.1	74.1	1479.0	13.0	74.1

The impact of the maximum dispensation on capacity allowed by the baseline planning assumptions

Profitable >10% IRR, 10% >marginal > 8%, unprofitable < 8%



Conclusions

- Aim of the study: would a dispensation on high TNUoS charges in specific locations have an impact on meeting RE targets?
- Scottish wind generators enjoy a better resource than the southern ones
- Dynamic modelling: ROC mechanism is self-correcting and should mitigate the effect of higher TNUoS charges through a feedback process
- Static modelling may be more representative of investment perspective and suggests that dispensation would have an impact on RE generation
- Under either position, if applied, a dispensation would not significantly change the level of renewable capacity
- It would however provide opportunities for new and developing technologies and the development of large-scale island based generation